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HAWAIIAN SPIDERS OF THE GENUS *TETRAGNATHA* II. SPECIES FROM NATURAL AREAS OF WINDWARD EAST MAUI

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ABSTRACT: The spider genus *Tetragnatha* is highly speciose in the Hawaiian Islands, diverse in morphology, ecology and behavior. The present study describes the distribution of 13 species of the genus from natural areas on the windward northern and eastern sections of Haleakala volcano, Maui, primarily in the Nature Conservancy of Hawaii's Waikamoi Preserve and Haleakala National Park. Six species do not build webs, and have recently been described; the remainder all build webs. The description of six new web-building species, *T. trituberculata* n. sp.,*T. eurychasma* n. sp., *T. acuta* n. sp., *T. filiciphilia* n. sp., *T. stelarobusta* n. sp., *T. paludicola* n. sp., is the primary focus of this paper.

Spiders are one of the primary predatory groups in Hawaiian ecosystems. Systematic studies on the group, however, are very limited (Karsch 1880; Simon 1900; Suman 1964, 1970; Okuma 1988). The most comprehensive work was that of Simon (1900), who worked on a small collection of Hawaiian spiders made by R. C. L. Perkins (Perkins 1913). Of all spider groups represented in the Hawaiian Islands, those of the genus *Tetragnatha* are the most conspicuous, and perhaps also the most widespread.

Outside Hawaii, representatives of the genus *Tetragnatha* are among the more homogeneous of spider genera in both morphology (elongate bodies and legs, and large chelicerae and endites [Kaston 1948; Levi 1981]) and ecology (Dabrowska Prot & Luczak 1968a, b; Dabrowska Prot et al. 1968). In Hawaii, however, the highly speciose genus is diverse in morphology, ecology and behavior. Preliminary morphological and molecular phylogenetic analyses (Croom, Gillespie & Palumbi in prep.) suggest that there are distinct clades of Hawaiian tetragnathids, each with its own unique set of characteristics.

This paper documents 13 representatives of the genus from two natural areas in the windward northern and eastern sections of the east Maui volcano, Haleakala: the Nature Conservancy of Hawaii's Waikamoi Preserve and Haleakala National Park, the two areas abutting each other to form an almost continuous swathe of native forest. The current systematic treatment is intended to allow future publications on research I have conducted on the ecology and behavior of the species in these areas. Two additional sites on windward Haleakala (Pohakuokala Gulch to the west and Hanawi Valley to the NE) were surveyed to determine the distribution of the 13 species across the mountain.

Haleakala National Park comprises a broad strip of land (11,400 ha) running from sea level in the east to the summit of Haleakala (3057 m) in the west, part of its western edge bordering the Waikamoi Preserve. The Preserve (2117 ha) continues west (NW) from this border (2653 m) running down to 1340 m. Average annual rainfall is generally high, increasing along a steep west-to-east gradient from 2000 mm to 5000 mm, with some areas exceeding 10,000 mm. The site surveyed in Hanawi Valley, which lies to the north of the National Park, was at 463 m. Pohakuokala Gulch, to the west of the National Park, was surveyed at 1524 m.

The vegetation in the National Park changes from disturbed Koa/'Ohi'a (*Acacia koa/Metrosideros polymorpha*) lowland wet forest in the east, up through more pristine Koa/'Ohi'a stands to 'Ohi'a montane wet forest interspersed with montane bogs in the west (Wagner et al. 1990; Medeiros, pers. comm.). In the Preserve, the vegetation changes from the 'Ohi'a montane wet forest at the border with the National Park, to Koa/'Ohi'a montane mesic forest in the west. The site examined at Hanawi is disturbed 'Ohi'a lowland wet forest, while Pohakuokala is disturbed Koa montane mesic forest. The dominant plants vary according to forest type, but the most common tree species are *A. koa* and *M. polymorpha*, as well as *Clermontia arborescens*, *Ilex anomala*, *Cheirodendron trigynum*, *Myrsine* spp. and *Pelea* spp. A number of species of ferns, in particular *Cibotium* spp. dominate the understo-

ry, along with *Vaccinium calycinum*, *Broussaisia arguta*, *Rubus hawaiensis* and *Alyxia oliviformis*.

Of the 13 species of *Tetragnatha* found in the Waikamoi Preserve and Haleakala National Park, six species do not build webs, and are considered in the Spiny Leg Clade of Hawaiian *Tetragnatha*, which has recently been described (Gillespie 1991). The other species form a diverse group of web-builders from an unknown number of clades, the description of which is the main focus of this paper. Five of these species are described from specimens collected in the Waikamoi Preserve. *T. paludicola* is described from specimens collected from the bogs on the north east rift of Haleakala (1676 m) in Haleakala National Park.

METHODS

Specimens were examined for both gross morphological features as well as for more detailed structure in the same manner as that used for other Hawaiian *Tetragnatha* (Gillespie 1991). I followed the terminology for cheliceral armature used by Okuma (1987, 1988). In males, the teeth on the promargin generally include 'Gu', a small distal tubercle; 'sl', the first major tooth; 'T', the second (usually larger) tooth; and 'rsu', the remaining proximal teeth on the promargin. The teeth on the retromargin generally include 'AXl', a small distal tubercle; 'Gl', the first major tooth, 'L2' the second 'L3' the third etc. 'a' is the dorsal cheliceral spur. For females, the cheliceral teeth are numbered from the distal end 'U1'—'U*n*' on the promargin and 'L1'—'L*n*' on the retromargin.

NON-WEB-BUILDING SPECIES (SPINY LEG CLADE)

Tetragnatha brevignatha Gillespie

Tetragnatha brevignatha, a member of the Green Spiny Leg group in the Spiny Leg clade, was found only in a small section of mid-elevation (1340 m) mesic forest on northern Haleakala, in the NW corner of the Waikamoi Preserve (Table 1).

Tetragnatha waikamoi Gillespie

Tetragnatha waikamoi, a second member of the Green Spiny Leg group, was found only in montane wet forest of northern Haleakala from 1310 m to 1876 m (Table 1). It was therefore abundant in the more northern Waikamoi Preserve, the only other place it was found being the bogs on the NE Rift of Haleakala in the National Park. To the west, the range of this species overlaps with *T. brevignatha* in a very narrow zone; to the east, the range comes close to that of *T. macracantha*, but no overlap zone has yet been found.

Tetragnatha macracantha Gillespie

Tetragnatha macracantha, the final member of the Green Spiny Leg group in this region, was found throughout the Kipahulu Valley of Haleakala National Park, from the lowest (610 m) to the highest (1980 m) elevations (Table 1). In addition, it was found in the lowland disturbed forest of Hanawi at 463 m. As mentioned, its range comes close to, but has not been found to overlap, that of *T. waikamoi*.

Tetragnatha kamakou Gillespie

Tetragnatha kamakou, a member of the Green and Red Spiny Leg group in the Spiny Leg clade, was found throughout montane wet forest of Haleakala National Park and the Waikamoi Preserve from 610 m to 1980 m (Table 1).

Tetragnatha quasimodo Gillespie

Tetragnatha quasimodo was found in abundance in both mesic and wet forests from the lowest (610 m) to the highest (1980 m) elevations in Haleakala National Park and the Waikamoi Preserve, as well as in Hanawi Valley and Pohakuokala Gulch (Table 1).

Tetragnatha restricta Simon

Tetragnatha restricta was found in mesic forest at all elevations (610 m to 1524 m) in Haleakala National Park, the Waikamoi Preserve and Pohakuokala Gulch (Table 1).

WEB-BUILDING SPECIES

Tetragnatha olindana Karsch

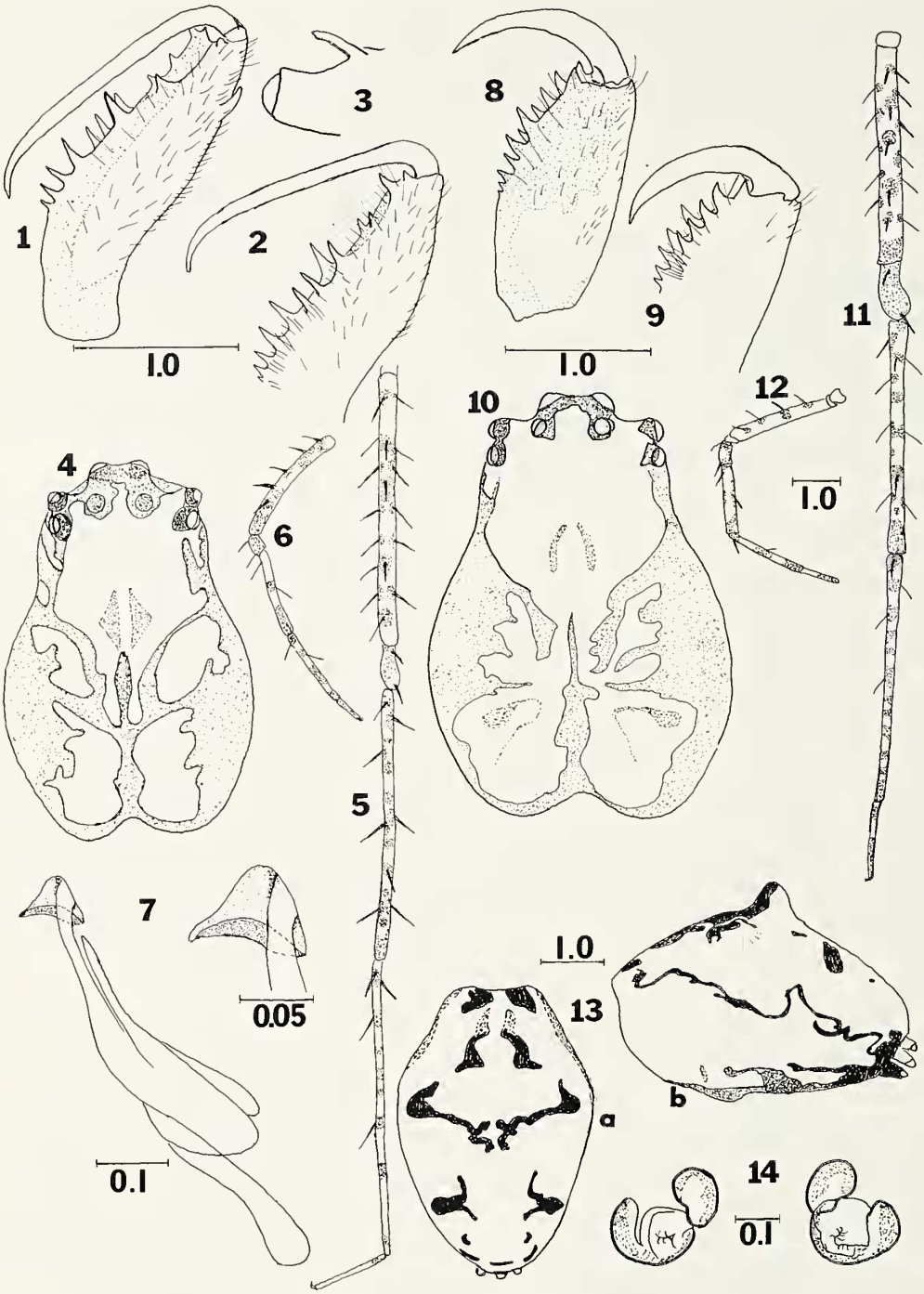
T. olindana was found only in low elevation (610 m) wet forest, in Hanawi and the Kipahulu Valley of Haleakala National Park (Table 1).

Tetragnatha trituberculata, new species (Figs. 1–14, 85)

Types.—Holotype male and allotype female from Waikamoi Gulch, Waikamoi, 1310 m, Maui Island (7 January 1991), collected by D. J. Preston, deposited in the Bishop Museum, Honolulu.

Table 1.—Distribution of species in the natural areas of windward east Maui. Locations are ordered from west (Pohakuokala, 1524 m) to east (Kipahulu Valley at 610 m).

			Waikamoi Preserve			Hale. Nat. Pk.		Haleakala National Park				
		Poha-kuo-kala		Car-ruthers	Hono-manu	N.E. Rift Bogs	Hanawi	Kipahulu Valley				
Elevation (m)		1524	Olinda 1340	1876	1585	1676	463	1980	1524	1220	914	610
T. waikamoi	Male		1	4	2	1						
	Fem		8	13	3	11						
	Imm		9	10	20	8						
T. brevignatha	Male		15									
	Fem		12									
	Imm		8									
T. macracantha	Male						2	2	1	4	6	16
	Fem						4	3	2	2	7	14
	Imm						13	2	11	29	45	31
T. kamakou	Male		1	4	4	2		1				
	Fem		5	9	3	9		1	2			
	Imm		5	30	7	20			13	3		1
T. quasimodo	Male		10	5				1		2	4	
	Fem	3	5	9	3	1	1	7	3	4	10	6
	Imm	6	12	20	2	2		3	4	4	18	14
T. restricta	Male	1	3								3	
	Fem	1	6								2	1
	Imm	2	3								4	
T. olindana	Male						4			1	2	2
	Fem						5			1	12	7
	Imm						35			2	25	10
T. trituber-culata	Male		1	6	1	1						
	Fem		1	1	3	6			2	3		
	Imm			5	2	4			2	9		
T. eurychasma	Male		1	7	2	2			1		1	1
	Fem		1	5	2	4	3		8	4	2	3
	Imm		1	8	9	6			5	4	1	3
T. acuta	Male		2		1							
	Fem		1		1	8	1	1				
	Imm		6			2						
T. filiciphilia	Male		7								1	
	Fem		11							1	2	
	Imm		8							6	2	
T. stelarobusta	Male		6	6	1	1						
	Fem		11	6		3			4			
	Imm		10	6		4			2			
T. paludicola	Male					5			2			
	Fem					16			5		5	
	Imm		2			10			17		2	



Figures 1–14.—*Tetragnatha trituberculata*; Male holotype. 1) Promargin of right chelicera; 2) Retromargin of left chelicera; 3) Dorsal spur of right chelicera, lateral view; 4) carapace, dorsal view; 5) Right leg I, dorsal view; 6) Right leg III, prolateral view; 7) Left palpus, prolateral view. Female allotype. 8) Promargin of right chelicera; 9) Retromargin of left chelicera; 10) Carapace, dorsal view; 11) Right leg I, dorsal view; 12) Right leg III, prolateral view; 13) abdomen, dorsal (a) and lateral (b) views; 14) Seminal receptacles, ventral view. Scale lines in mm. Scale of Figs.1–3 indicated below 1; scale of Figs. 4, 8, 9, 10 indicated below 8; scale of Figs. 5, 6, 11, 12 indicated below 12.

Etymology.—Tri (Greek) three; tuberculum (Latin) tubercle. The specific epithet is used in its adjectival form and refers to the transverse procurved row of tubercles across the abdomen of this speeies.

Diagnosis.—*T. trituberculata* is not easily confused with any other species. The most diagnostic feature is the series of transverse abdominal lobes, accentuated by the distinctive black pattern. Even where the abdominal tubercles are reduced (as in mature males), the pattern is highly diagnostic, and does not appear to fade in alcohol.

Description.—*Holotype male:* (Figs. 1–7). Promargin of chelicerae (Fig. 1): Distance between 'Gu', 'sl' and 'T' approximately equal, ratio of distal end to 'sl': 'sl' to 'T': 'T' to 'rsu1' 4:3:3. 'Gu' pronounced, small, cone-shaped tubercle; 'sl' medium-sized cone directed out perpendicular to margin of chelicerae; narrower than 'T' by 90% (70–90%), and shorter, 60% height (50–60%). 'T' moderately tall, robust, rocket-shaped. 'rsu' 4 (3–4) spikes, 'rsu1' and 'rsu2' diverging slightly along vertical plane. Retromargin of chelicerae (Fig. 2): Total of only 4 (up to 7) teeth. 'AXl' small, but conspicuous triangular notch; 'Gl' strong, similar width and height to 'L3', 'L4' and 'L5', much stronger than 'L2'. 'L2' set farther back into fang groove than other teeth on retromargin. Dorsal spur long, shaped like slim, bent finger (14.0% length of cephalothorax); tip slightly longer on dorsal surface (Fig. 3). Cheliceral fang slightly shorter than base, bent sharply at both proximal and distal ends. Cephlothorax 2.5 mm, total length 5.6 mm. Chelicerae shorter (84%) than cephalothorax. Depression of thoracic fovea distinctly marked with dark lines radiating out from center (Fig. 4). Leg spination similar to female (Figs. 5, 6). Femur I: 6 prolateral, 5 dorsal, 6 retrolateral spines. Tibia I: 3 prolateral, 2 dorsal, 3 retrolateral spines. Metatarsus I: 1 prolateral, 1 dorsal, 2 retrolateral spines. Femur III: 4 dorsal, 1 prolateral, no ventral spines. Tibia III: 1 dorsal, 1 prolateral spine. Coloration and eye pattern similar to female.

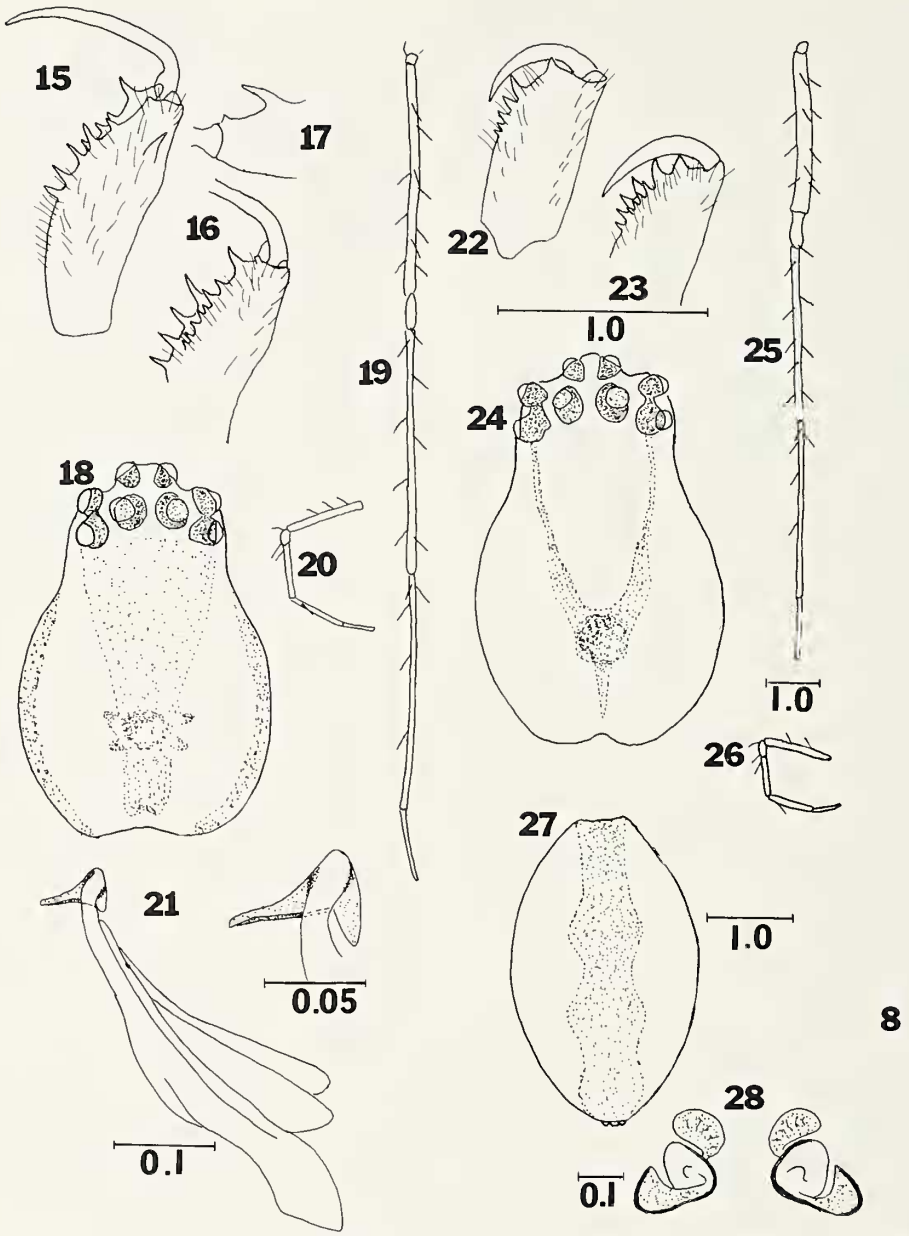
Conductor Tip: (Figs. 7 and 85). Smoothly rounded, almost symmetrical, high-peaked cap, terminating in small, downward-pointing, beak-like tip.

Allotype female: (Figs. 8–14). Eye area heavily pigmented, distance between PME smaller than eye area itself (Fig. 10). Median ocular area wider posteriorly. Lateral eyes loosely contiguous. Promargin of chelicerae (Fig. 8): series of 7 teeth, 'U1' very robust, considerably wider but shorter (66%) than 'U2'; separated from 'U2' by 13% cheliceral length. 'U2'–'U7' gradually decreasing in size proximally. Retromargin of chelicerae (Fig. 9): series of 5 teeth, 'L1' slightly shorter (90%) than 'U1', much smaller (69%) than 'L2'. 'L1' contiguous with 'L2', teeth decreasing in size proximally. Cheliceral fang short, approximately 77% length of base, tapering to smooth point at distal end. Cephlothorax 2.9 mm, total length 7.6 mm. Chelicerae rather short, 60% length of cephalothorax. Legs heavily spotted, banded with dark brown (bottle green in life) on pale cream (Figs. 11–12). Spines short (19% length of cephalothorax) but robust. Femur I: 6 prolateral, 5 dorsal, 5 retrolateral spines. Tibia I: 3 prolateral, 2 dorsal, 3 retrolateral spines. Metatarsus I: 1 dorsal, 2 retrolateral spines. Femur III: 3 dorsal, 1 prolateral, no ventral spines. Tibia III: 1 dorsal spine, 1 prolateral spine. Cephlothorax pale brown, with a distinct fovea marked by very dark lines radiating out from center (Fig. 10). Sternum dusky black. Abdomen broad, deep, width and depth both approximately 35% of total length. Dorsum of abdomen green/brown (bright bottle-green in life), with distinct black markings (Fig. 13a). Transverse procurved row of three tubercles on abdomen, each accentuated by black marks bordering all except median border in lateral tubercles, and all sides (except for narrow proximal and distal "window") on medial tubercle (Fig. 13b). Venter dark brown/black with 2 pairs of gold vertical bars on either side of midline.

Seminal receptacles: (Fig. 14). Two bulbs linked in tight opposing "comma" shapes, each well sclerotized on medial border. Both bulbs equally dilated. Central portion a robust stalk between bulbs. Median lobe an angular balloon projecting from stalk, fitting snugly sandwiched between bulbs.

Color polymorphism.—Little evidence of this.

Material Examined.—This species is found in wet forest only, from 1220 m to 1890 m in Haleakala National Park and the Waikamoi Preserve (Table 1). *Maui Island*: Haleakala. Honomanu Gulch, 1876 m, 29-V-88, 22-VI-89 & 5-II-90 (R. G. Gillespie & C. Parrish); 1585 m, 6-II-90 (R. G. Gillespie). Waikamoi Gulch, 1310 m, 13-VIII-88 (R. G. Gillespie & C. Parrish); 7-I-91 (D. J. Preston); Bogs, NE Rift Haleakala, 1,676 m, 15-I-88, 16-I 88, 17-I-88 & 18-I-88 (R. G. Gillespie & A. C. Medeiros); Kipahulu Valley, 1220 m, 15-V-90 (R. G. Gillespie & A. C. Medeiros); 1524 m, 14-V-90 (R. G. Gillespie & A. C. Medeiros).



Figures 15–28.—*Tetragnatha eurychasma*; Male holotype. 15) Promargin of right chelicera; 16) Retromargin of left chelicera; 17) Dorsal spur of right chelicera, lateral view; 18) carapace, dorsal view; 19) Right leg I, dorsal view; 20) Right leg III, prolateral view; 21) Left palpus, prolateral view. Female allotype. 22) Promargin of right chelicera; 23) Retromargin of left chelicera; 24) Carapace, dorsal view; 25) Right leg I, dorsal view; 26) Right leg III, prolateral view; 27) abdomen, dorsal view; 28) Seminal receptacles, ventral view. Scale lines in mm. Scale of Figs. 15–18, 22–24 indicated below 23; scale of 19, 20, 25, 26 indicated below 25.

Tetragnatha eurychasma, new species
(Figs. 15–28, 86)

Types.—Holotype male from Honomanu Gulch, Waikamoi, 1585 m, Maui Island (6 February 1990), collected by R. G. Gillespie; allotype female from Carruther's Camp, Honomanu Valley, Waikamoi, 1876 m, Maui Island (29 May 1988), collected by R. G. Gillespie and C. Parrish, deposited in the Bishop Museum, Honolulu.

Etymology.—Eurys (Greek) broad; chasma (Greek) cleft, opening. The specific epithet is used

in its adjectival form and refers to the web of the species, which, although of the basic tetragnathid type (fragile, open hub), has generally very large spaces ($\bar{X}$ = 1.38 cm, SD = 0.27, n = 8) between the radial lines.

Diagnosis.—*T. eurychasma* is unlikely to be confused with other species from Waikamoi. Its distinctive black and silver coloration and smoothly oval abdomen are characteristic of live specimens. In alcohol, the most distinctive features are its abdominal pattern, short leg spines and cheliceral armature.

Description.—*Holotype male:* (Figs. 15–21). Promargin of chelicerae (Fig. 15): Distance between 'Gu' and 'sl' much greater than 'sl' and 'T', ratio of distal end to 'sl': 'sl' to 'T': 'T' to 'rsu1' 5:3:2. 'Gu' very small, inconspicuous, flat-topped tubercle; 'sl' sharp, wedge directed slightly downwards towards 'T'; narrower than 'T', by 63% (53–65%), and shorter, 53% (40–55%) height. 'T' moderately tall, directed perpendicular from margin of chelicerae, but curved slightly up towards 'sl'. 'rsu' 3 (up to 5) spikes, 'rsu1' slightly closer to 'T' than to 'rsu2'. Retromargin of chelicerae (Fig. 16): Total of 8 (7) teeth. 'AXl' small, almost square notch; 'Gl' strong, much taller than all other teeth on retromargin; 'L3' next in size, 'L2' smaller, remainder of teeth considerably smaller than 'L2'. Dorsal spur long, shaped like slim, bent finger (15.7% length of cephalothorax, 15.5–15.8%); tip pointed, upper margin projecting slightly beyond lower (Fig. 17). Cheliceral fang considerably shorter than base, bent sharply at proximal end and curved slightly at distal end. Cephlothorax 1.7 mm (1.7–1.8), total length 3.0 mm (2.9–3.1). Chelicerae shorter (70%, 70–71%) than cephalothorax. Cephalothoracic pattern a distinct, dark flask shape, constricted at thoracic fovea (Fig. 18). Leg spination similar to female (Figs. 19, 20). Femur I: 4 prolateral, 3 dorsal, 3 retrolateral spines. Tibia I: 3 prolateral, 2 dorsal, 3 retrolateral spines. Metatarsus I: 1 prolateral, 1 dorsal, 3 retrolateral spines. Femur III: 3 dorsal, no ventral spines. Tibia III: 1 dorsal spine. Coloration and eye pattern similar to female.

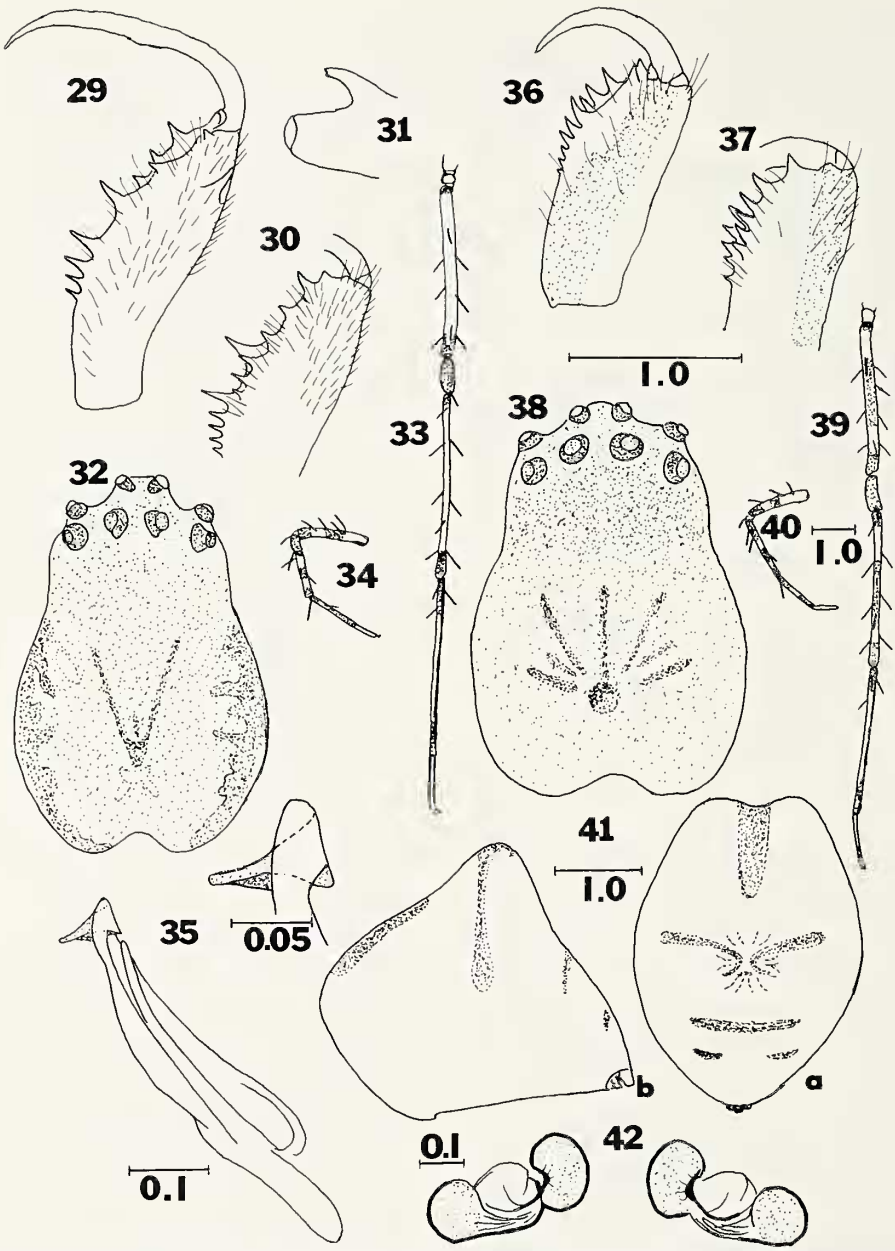
Conductor Tip: (Figs. 21 and 86). High-peaked cap, leading out to narrow, straight, horizontal projection (width similar to cap) which terminates in small, downward-pointing, beak-like tip.

Allotype female: (Fig. 22–28). PME separated by less than half width of PME (Fig. 24). Median ocular area almost square. Lateral eyes loosely contiguous. Promargin of chelicerae (Fig. 22): series of 6 teeth, 'U1' moderate size, similar in width, but shorter (66%) than 'U2'; separated from 'U2' by 13% cheliceral length. 'U2'–'U6' gradually decreasing in size proximally. Retromargin of chelicerae (Fig. 23): series of 6 teeth, 'L1' slightly shorter (90%) than 'U1', much smaller (69%) than 'L2'. 'L1' contiguous with 'L2', teeth decreasing in size proximally. Cheliceral fang short, approximately 64% length of base, tapering to smooth point at distal end. Cephlothorax 1.8 mm, total length 5.4 mm. Chelicerae short, 50% length of cephalothorax. Legs almost uniformly brown. Spines small, rather inconspicuous (19% length of cephalothorax). Femur I: 4 prolateral, 3 dorsal, 3 retrolateral spines. Tibia I: 3 prolateral, 2 dorsal, 3 retrolateral spines. Metatarsus I: 1 prolateral, 1 dorsal, 3 retrolateral spines (Fig. 25). Femur III: 2 dorsal, no ventral spines. Tibia III: 1 dorsal spine (Fig. 26). Cephlothorax pale brown; fovea distinctly marked by dark area, lines running short distances from anterior and posterior margins, broader lines running forward from anterior lateral margins to lateral eyes (Fig. 24). Sternum uniformly pale tan. Abdomen smoothly elongate oval, width and depth both approximately 22% of total length. Dorsum of abdomen silvery, with wide, longitudinal medial dark bar (slightly undulating margins) running down length (Fig. 27). Venter pale tan with 2 pairs of gold spots on either side of midline.

Seminal receptacles: (Fig. 28). Upper bulb oval, set at 45° to main angle of body, lower bulb shaped like "top", upper border peaked. Two bulbs linked in opposing "C" shapes, lower bulb slightly smaller, projecting slightly farther out than upper. Bulbs joined by rather long, curved stalk. Median lobe an irregular balloon projecting from stalk fitting well inside area defined by bulbs.

Color polymorphism.—Little evidence of this.

Material Examined.—This species is found throughout wet forests of Haleakala National Park and the Waikamoi Preserve, but is most abundant at higher elevations (Table 1). *Maui Island*: Haleakala. Honomanu Gulch, 1876 m, 29-V-88, 22-VI-89 & 5-II-90 (R. G. Gillespie & C. Parrish); 1585 m, 6-II-90 (R. G. Gillespie). Waikamoi Gulch, 1310 m, 13-VIII-88 (R. G. Gillespie & C. Parrish); 7-I-91 (D. J. Preston). Opana Gulch, 1340 m, 8-VI-88 (R. G. Gillespie & C. Parrish); 8-II-90 (R. G. Gillespie & J. Burgett). Hanawi Valley, 1340 m, 9-II-90 (R. G. Gillespie & R. Rydell). Bogs, NE Rift Haleakala, 1676 m, 15-I-88, 16-I 88, 17-I-88 & 18-I-88 (R. G. Gillespie & A. C. Medeiros); Kipahulu Valley, 610 m, 17-V-90, 914 m, 16-V-90, 1220 m, 15-V-90, 1524 m, 14-V-90 (R. G. Gillespie & A. C. Medeiros).



Figures 29–42.—*Tetragnatha acuta*; Male holotype. 29) Promargin of right chelicera; 30) Retromargin of left chelicera; 31) Dorsal spur of right chelicera, lateral view; 32) carapace, dorsal view; 33) Right leg I, dorsal view; 34) Right leg III, prolateral view; 35) Left palpus, prolateral view. Female allotype. 36) Promargin of right chelicera; 37) Retromargin of left chelicera; 38) Carapace, dorsal view; 39) Right leg I, dorsal view; 40) Right leg III, prolateral view; 41) abdomen, dorsal (a) and lateral (b) views; 42) Seminal receptacles, ventral view. Scale lines in mm. Scale of Figs. 29–32, 36–38 indicated below 36; scale of 33, 34, 39, 40 indicated beside 40.

Tetragnatha acuta, new species
(Figs. 29–42)

Types.—Holotype male from Honomanu Valley, Waikamoi, 1585 m, Maui Island (6 February 1990), collected by R. G. Gillespie; allotype female from Opana Gulch, Waikamoi, 1340 m, Maui Island (8 February 1990), collected by R. G. Gillespie and J. Burgett, deposited in the Bishop Museum, Honolulu.

Etymology.—Acuta (Latin) acutely angled. The

specific epithet is used in its adjectival form and refers to the high, pointed abdomen of this species.

Diagnosis.—The dark brown/black coloration with transverse lines, and the single medial tubercle on the abdomen are highly distinctive for *T. acuta*.

Description.—*Holotype male:* (Fig. 29–35). Promargin of chelicerae (Fig. 29): Distance between 'Gu', 'sl' and 'T' approximately equal, ratio of distal end to 'sl': 'sl' to 'T': 'T' to 'rsu1' 3: 3:3. 'Gu' pronounced, small, rounded tubercle; 'sl' wedge-shaped, directed downwards towards 'T'; narrower than 'T', by 69%, and shorter, 49% height. 'T' moderately tall, directed almost perpendicular from cheliceral margin. 'rsu' series of 4 spikes. Retromargin of chelicerae (Fig. 30): Total of only 6 teeth. 'AXl' small, pointed cone; 'Gl' strong, much stronger than all other teeth on retromargin; 'L2' and 'L3' short and robust; 'L4' and 'L5' taller and narrower. Dorsal spur shaped like thick, bent finger (18.8% length of cephalothorax); tip minutely bifurcate (Fig. 31). Cheliceral fang considerably shorter than base, bent sharply at proximal end and curved at distal end. Cephlothorax 2.2 mm, total length 5.1 mm. Chelicerae shorter (80%) than cephalothorax. Cephalothorax very dark, with darker margins, and dark "V" shape leading into thoracic fovea (Fig. 32). Legs banded, spination similar to female (Figs. 33–34). Femur I: 3 prolateral, 2 dorsal, 3 retrolateral spines. Tibia I: 3 prolateral, 2 dorsal, 3 retrolateral spines. Metatarsus I: 1 prolateral, 1 dorsal, 1 retrolateral spines. Femur III: 4 dorsal, no ventral spines. Tibia III: 1 dorsal, 1 prolateral spine. Coloration and eye pattern similar to female.

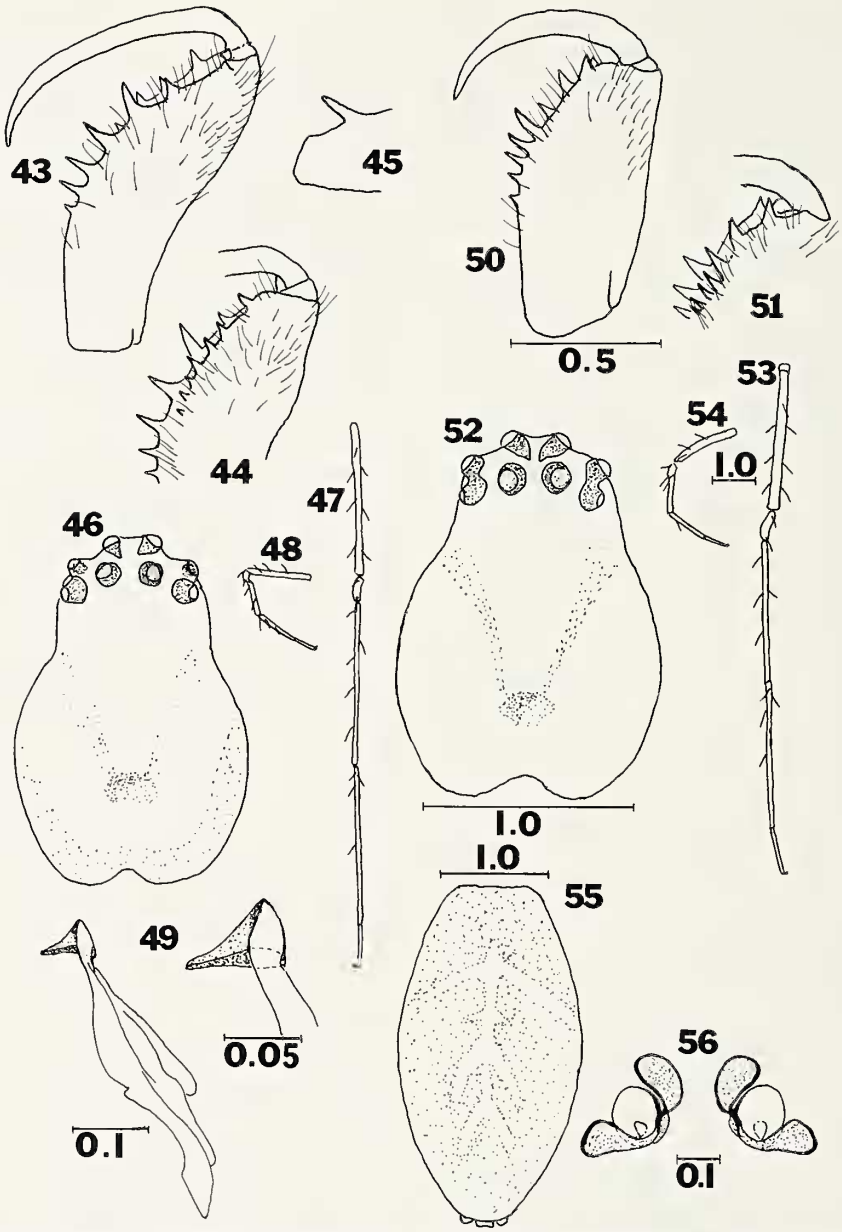
Conductor Tip: (Fig. 35). High-peaked cap, curved sharply, leading out to narrow, straight, horizontal projection of similar width to cap, which terminates in rounded, blunt tip.

Allotype female: (Figs. 36–42). PME separated by just more than half width of PME (Fig. 38). Median ocular area almost square. Lateral eyes well separated. Promargin of chelicerae (Fig. 36): series of 7 teeth, 'U1' rather small, upwardly directed cone, much smaller (45% length) than 'U2'; widely separated from 'U2' by 26% cheliceral length. 'U2'–'U7' gradually decreasing in size proximally. Retromargin of chelicerae (Fig. 37): series of 6 teeth, 'L1' slightly taller (147%) than 'U1' and similar in size (95%) to 'L2'. 'L1' well separated from 'L2'; rest of teeth on retromargin of similar height. Cheliceral fang short, approximately 69% length of base, tapering to smooth point at distal end. Cephlothorax 2.3 mm, total length 5.8 mm. Chelicerae moderately short, 62% length of cephalothorax. Legs with wide proximal, medial and distal dark bands (Figs. 39–40). Spines small, rather inconspicuous (18% length of cephalothorax). Femur I: 4 prolateral, 2 dorsal, 3 retrolateral spines. Tibia I: 3 prolateral, 2 dorsal, 3 retrolateral spines. Metatarsus I: 1 prolateral, 1 dorsal, 1 retrolateral spines. Femur III: 3 dorsal, 1 prolateral, no ventral spines. Tibia III: 1 dorsal, 1 prolateral spine. Cephalothorax very dark, with darker margins, and dark "V" shape leading into thoracic fovea (Fig. 38). Sternum dark brown or black. Abdomen quite broad (width approximately 42% of total length), very deep (depth approximately 57% of total length) (Fig. 41b). Dorsum of abdomen dark gray/brown, with variable transverse markings, much more heavily marked on posterior margin, where lines converge upwards towards single, pointed, medial tubercle (Fig. 41a). Venter with rather broad black line running longitudinally down midline, bordered along length by paler stripes.

Seminal receptacles: (Fig. 42). Two bulbs spherical-to-oval, upper rather boxing-glove-shaped, lower round. Linked by rather long stalk running almost horizontally. Each bulb fairly well sclerotized on medial border. Both bulbs equally dilated. Median lobe small balloon shape (smaller than bulbs) projecting from stalk, situated in free space between widely separated bulbs.

Color polymorphism.—The color and extent of patterning in this species is highly variable. Some species have a medial bar (pink, brown or black, but darker than the base eolor) running longitudinally from the anterior edge of the abdomen to the midline; in others this is absent. All specimens examined to date have some form of transverse line running across the midline, converging on the medial protuberance. Also variable transverse bars posterior to the midline.

Material Examined.—This species is scattered throughout Haleakala National Park and the Waikamoi Preserve, rarely abundant (Table 1). *Maui Island*: Haleakala. Honomanu Gulch, 1585 m, 6-II-90 (R.G. Gillespie). Opana Gulch, 1340 m, 8-VI-88 (R. G. Gillespie & C. Parrish); 8-II-90 (R.G. Gillespie & J. Burgett). Hanawi Valley, 1340 m, 9-II-90 (R. G. Gillespie & R. Rydell). Bogs, NE Rift Haleakala, 1676 m, 15-I-88, 16-I 88, 17-I-88 & 18-I-88 (R. G. Gillespie & A. C. Medeiros). Kipahulu Valley, 1980 m, 27-IV-88 (R. G. Gillespie & A. C. Medeiros).



Figures 43–56.—*Tetragnatha filiciphilia*; Male holotype. 43) Promargin of right chelicera; 44) Retromargin of left chelicera; 45) Dorsal spur of right chelicera, lateral view; 46) carapace, dorsal view; 47) Right leg I, dorsal view; 48) Right leg III, prolateral view; 49) Left palpus, prolateral view. Female allotype. 50) Promargin of right chelicera; 51) Retromargin of left chelicera; 52) Carapace, dorsal view; 53) Right leg I, dorsal view; 54) Right leg III, prolateral view; 55) abdomen, dorsal view; 56) Seminal receptacles, ventral view. Scale lines in mm. Scale of Figs. 43–45, 50, 51 indicated below 50; scale of 46, 52 indicated below 52; scale of 47, 48, 53, 54 indicated beside 53.

Tetragnatha filiciphilia, new species
(Figs. 43–56, 87)

Types.—Holotype male and allotype female from Waikamoi Gulch, Waikamoi, 1310 m, Maui Island (8 July 1988), collected by R. G. Gillespie and C. Parrish, deposited in the Bishop Museum, Honolulu.

Etymology.—Filix (Latin) fern; philia (Greek) affinity for. The specific epithet is used in its adjectival form and refers to the tendency of this

species to build its web under the fronds of ferns, of which tree ferns are one of the dominant groups.

Diagnosis.—In life, *T. feliciphilia* is immediately recognizable on the basis of its distinctive green coloration, with the medial red bar on the posterior of the abdomen. It might be confused with members of the Green Spiny Leg clade, although inspection of the legs, with their few, small and weak spines (appear almost smooth to the naked eye) readily indicates its lack of allegiance to this clade. Specimens preserved in alcohol might be confused with *T. eurychasma*, but is easily recognized by the lack of paired gold spots on the venter. Also, the (apparent) lack of any distinct abdominal pattern, the pale coloration of the cephalothorax, and (in males) the cheliceral armature readily identifies *T. feliciphilia*.

Description.—*Holotype male:* (Figs. 43–49). Promargin of chelicerae (Fig. 43): Distance between distal margin, 'sl' and 'T' approximately equal, ratio of distal end to 'sl': 'sl' to 'T': 'T' to 'rsu1' 4:3:3 (3:3:4). 'Gu' absent, represented only by few strong hairs; 'sl' medium-sized cone directed out perpendicular to margin of chelicerae; narrower than 'T', by 61% (60–95%), much shorter, 51% height (50–55%). 'T' moderately tall, robust, rocket-shaped, leaning slightly up towards 'sl'. 'rsu' 4 straight spikes perpendicular to margin of chelicerae. Retromargin of chelicerae (Fig. 44): Total of 7 (6) teeth. 'AXl' absent; 'Gl' stronger than any other tooth on retromargin. Dorsal spur short, shaped like straight finger (9.6% length of cephalothorax, 9.5–10.0%); tip a single, slightly blunt, point (Fig. 45). Cheliceral fang considerably shorter than base, bent at proximal end, slightly curved at distal end. Cephlothorax 1.6 mm (1.4–1.7), total length 3.9 mm (3.0–4.0). Chelicerae much shorter (67%, 60–68%) than cephalothorax. Cephalothorax pale yellow, darker at depression of thoracic fovea, where dark lines radiate forwards and laterally from sides towards margin of cephalothorax (Fig. 46). Leg spination similar to female (Figs. 47–48). Femur I: 3 prolateral, 1 dorsal, 3 retrolateral spines. Tibia I: 1 prolateral, 1 dorsal, 3 retrolateral spines. Metatarsus I: 1 prolateral, 1 dorsal, 2 retrolateral spines. Femur III: 2 dorsal, 1 prolateral spines, no ventral spines. Tibia III: 1 dorsal, 1 prolateral spine. Coloration and eye pattern similar to female.

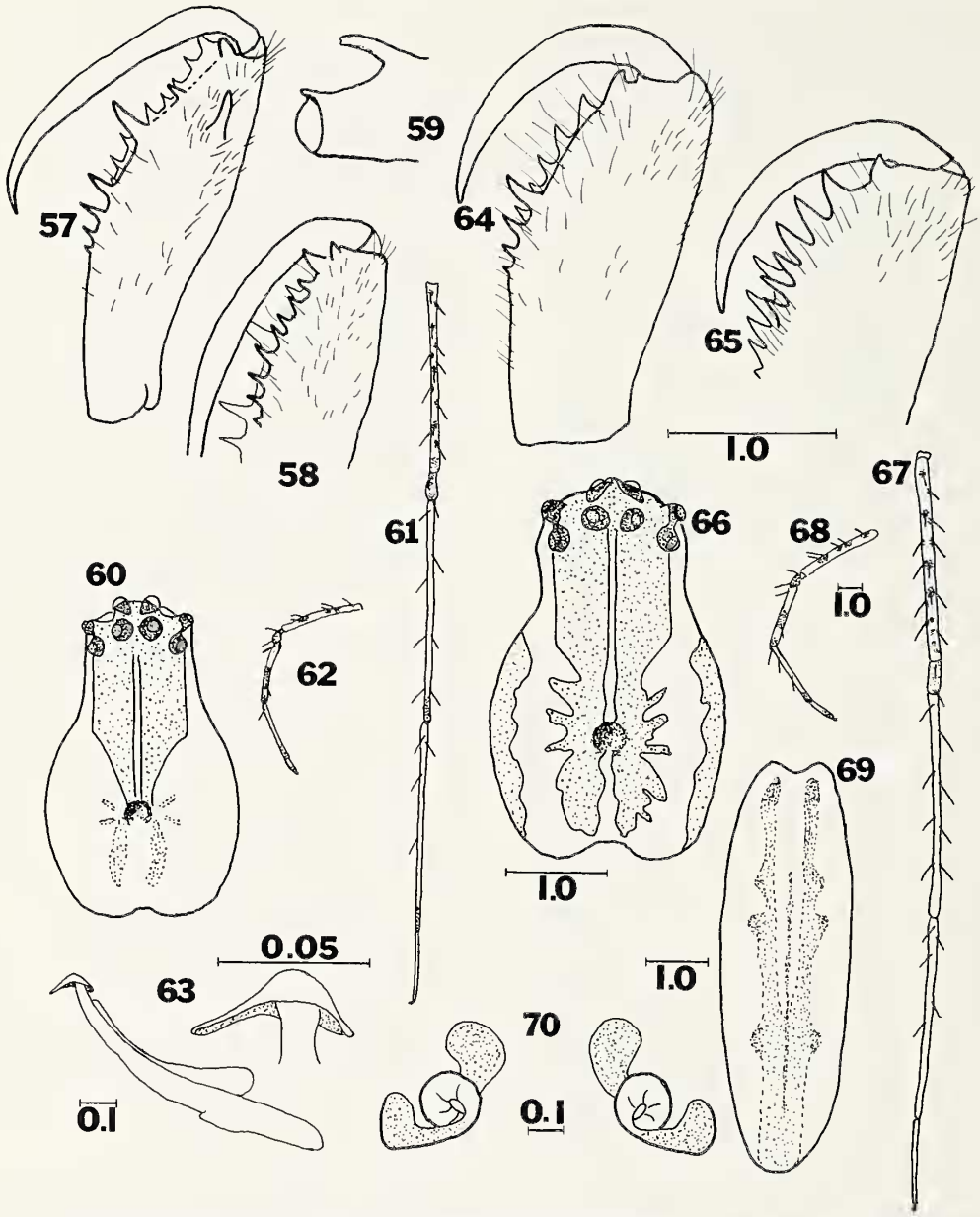
Conductor Tip: (Figs. 49, 87). Moderately high, rather pointed cap, drawn out laterally into narrow, straight, almost horizontal projection of similar width to cap, which terminates in slightly beaked, blunt tip.

Allotype female: (Figs. 50–56). PME separated by approximately half width of PME (Fig. 52). Median ocular area wider posteriorly. Lateral eyes contiguous. Promargin of chelicerae (Fig. 50): series of 6 teeth, 'U1' medium sized, much smaller (50% height) than 'U2'; widely separated from 'U2' by 24% cheliceral length. 'U2'–'U6' gradually decreasing in size proximally. Retromargin of chelicerae (Fig. 51): series of 7 teeth, 'L1' taller (128%) than 'U1', slightly smaller (91%) than 'L2'. 'L1', 'L2' and 'L3' well separated, 'L2' and 'L3' largest teeth on retromargin. 'L4'–'L7' rather small and close together. Cheliceral fang short, approximately 80% length of base, tapering to smooth point at distal end. Cephlothorax 1.7 mm, total length 4.8 mm. Chelicerae rather short, 62% length of cephalothorax. Legs uniformly pale yellow. Spines very small and inconspicuous (15% length of cephalothorax). Femur I (Fig. 53): 3 prolateral, 1 dorsal, 3 retrolateral spines. Tibia I: 1 prolateral, 1 dorsal, 3 retrolateral spines. Metatarsus I: 1 prolateral, 1 dorsal, 2 retrolateral spines. Femur III (Fig. 54): 2 dorsal, 1 prolateral, no ventral spines. Tibia III: 1 dorsal spine. Cephalothorax pale yellow, with darker lines from antero-lateral margins of cephalothorax converging broadly towards fovea. Sternum uniformly pale yellow to brown. Abdomen elongate oval, sometimes slightly domed, width and depth both approximately 23% of total length (Fig. 55). Dorsum of abdomen almost uniformly speckled silver, iridescent lime green in life, with broad, conspicuous medial red bar running from just behind midline to posterior margin of abdomen. Venter silvery with broad medial longitudinal brown bar, expanded anterior to epigastric furrow.

Seminal receptacles: (Fig. 56). Upper bulb elongate-oval, at about 45° to body axis; lower bulb round-oval. Each bulb has fairly well sclerotized medial border. Both bulbs dilated, but lower smaller than upper. Median lobe angular and irregular doughnut-shape arising from stalk between fairly widely separated bulbs.

Color polymorphism.—Little evidence of this.

Material Examined.—This species occurs at mid and lower elevations in Haleakala National Park and Waikamoi Preserve (Table 1). *Maui Island*: Haleakala. Waikamoi Gulch, 1310 m, 8-VII-88 & 13-VIII-88 (R. G. Gillespie & C. Parrish); 7-I-91. Opana Gulch, 1340 m, 9-IV-88 & 26-V-88 (R. G. Gillespie); 8-VI-88 (R. G. Gillespie & C. Parrish) & 8-II-90 (R. G. Gillespie



Figures 57–70.—*Tetragnatha stelarobusta*; Male holotype. 57) Promargin of right chelicera; 58) Retromargin of left chelicera; 59) Dorsal spur of right chelicera, lateral view; 60) carapace, dorsal view; 61) Right leg I, dorsal view; 62) Right leg III, prolateral view; 63) Left palpus, prolateral view. Female allotype. 64) Promargin of right chelicera; 65) Retromargin of left chelicera; 66) Carapace, dorsal view; 67) Right leg I, dorsal view; 68) Right leg III, prolateral view; 69) abdomen, dorsal view; 70) Seminal receptacles, ventral view. Scale lines in mm. Scale of Figs. 57–59, 64, 65 indicated below 65; scale of 60, 66 indicated below 66; scale of 61, 62, 67, 68 indicated beside 68.

& J. Burgett). Kipahulu Valley, 914 m, 16-V-90, 1220 m, 15-V-90 (R. G. Gillespie & A. C. Medeiros).

Tetragnatha stelarobusta, new species
(Figs. 57–70, 88, 89)

Types.—Holotype male from Waikamoi Gulch, Waikamoi, 1340 m, Maui Island (12 July 1988), collected by R. G. Gillespie; allotype female from Waikamoi Gulch, Haleakala, 1310 m, Maui Island (13 August 1988), collected by R. G. Gillespie, deposited in the Bishop Museum, Honolulu.

Etymology.—Stele (Greek) cylinder; robustus

(Latin) robust. The specific epithet is used in its adjectival form and refers to the robust cylindrical abdomen with longitudinal striping.

Diagnosis.—*T. stelarobusta* can be recognized by its elongate, cigar shape, the distinctive cephalothoracic pattern (especially the medial pale line), its large size and brown coloration with a pattern that is longitudinal, never transverse.

Description.—*Holotype male:* (Figs. 57–63). Promargin of chelicerae (Fig. 57): Distance between 'Gu' and 'sl' slightly greater than that between 'sl' and 'T', ratio of distal end to 'sl': 'sl' to 'T': 'T' to 'rsu1' 4:3:4 (4:3:3). 'Gu' broad, robust, rounded tubercle; 'sl' rather small, narrow (medium-width) cone directed out perpendicular to margin of chelicerae; narrower (by 30%, 30–60%) and shorter (by 44% height, 40–45%) than 'T'. 'T' tall, very robust, rocket-shaped, leaning very slightly up towards 'sl'. 'rsu' 4 (5) narrow, straight spike perpendicular to margin of chelicerae. Retromargin of chelicerae (Fig. 58): Total of 9 (6–9) teeth. 'AXl' robust, rounded tubercle; 'Gl' very wide and robust, much stronger than any other tooth on retromargin. Dorsal spur long, shaped like curved finger (15.5% length of cephalothorax); tip broad, very blunt, with evidence of minute bifurcation (Fig. 59). Cheliceral fang slightly shorter than base, bent at both proximal and distal ends. Cephalothorax 3.0 mm (2.7–3.0), total length 7.4 mm (7.0–7.5). Chelicerae shorter (80%, 70–80%) than cephalothorax. Cephalothoracic markings similar to female (Fig. 60). Leg spination similar to female (Figs. 61–62). Femur I: 5 prolateral, 4 dorsal, 3 retrolateral spines. Tibia I: 3 prolateral, 1 dorsal, 3 retrolateral spines. Metatarsus I: 1 prolateral, 1 dorsal, 2 retrolateral spines. Femur III: 3 dorsal, 2 prolateral, no ventral spines. Tibia III: 1 dorsal, 1 prolateral spine. Coloration and eye pattern similar to female.

Conductor Tip: (Figs. 63, 88, 89). Broad, low, rounded cap, almost symmetrical, but drawn out laterally into moderately narrow, straight, projection of similar width to cap, which terminates in spatulate, slightly beaked, blunt tip.

Allotype female: (Figs. 64–70). PME separated by just over half width of PME (Fig. 66). Median ocular area almost square. Lateral eyes very loosely contiguous. Promargin of chelicerae (Fig. 64): series of 5 teeth, with minute nipple on very apex of tooth row (absent in some individuals). 'U1' very wide, wedge-shaped, slightly wider but considerably shorter (40%, 40–50%) than 'U2'; widely separated from 'U2' by 37% (35–47%)cheliceral length. 'U3' much smaller than 'U2', 'U3'–'U5' gradually decreasing in size proximally. Retromargin of chelicerae (Fig. 65): series of 7 teeth, 'L1' similar in shape and slightly larger than 'U1' (124% height, 115–125%), much smaller (50% height, 50-67%) than 'L2'. 'L1' well separated from 'L2', remainder of teeth closer together. Teeth gradually decreasing in size proximally. Cheliceral fang moderately long, approximately 84% length of base, tapering to smooth point at distal end. Cephalothorax 3.6 mm (3.5–3.8), total length 9.5 mm (9.3–12.0). Chelicerae rather short, 64% (55–65%) length of cephalothorax. Legs lightly spotted, at least on femora, many of spots associated with spines (Figs. 67–68). Spines small (21% length of cephalothorax), but conspicuous because of dark pigment at base. Femur I: 5 prolateral, 4 dorsal, 4 (3) retrolateral spines. Tibia I: 4 prolateral, 1 dorsal, 3 retrolateral spines. Metatarsus I: 2 prolateral, 1 dorsal, 2 retrolateral spines. Femur III: 3 dorsal, 2 prolateral, no ventral spines. Tibia III: 1 dorsal, 1 prolateral spine. Cephalothoracic pattern very distinct: narrow, pale line running straight down midline, formed by separation of pair of wide, dark bands running down either side of midline as straight columns which constrict and converge towards midline, with small tendrils radiating laterally from fovea (Fig. 66). Lateral margins on posterior part of cephalothorax also dark. Sternum dark coppery brown with dark margins. Abdomen cigar-shaped, width and depth both approximately 18% of total length (Fig. 69). Dorsum of abdomen with variable, straight-to-undulating dark marks on tan-brown. Venter with rather broad black line running longitudinally down midline, bordered along length by paler stripes.

Seminal receptacles: (Fig. 70). Two bulbs linked in opposing crescent shapes. Both bulbs well dilated, upper bulb slightly larger than lower, lower projecting considerably farther out than upper. Median lobe takes form of doughnut projecting from stalk, situated in free space between widely separated bulbs.

Color polymorphism.—This species is highly variable in the nature of the longitudinal lines running down the chestnut-brown abdomen. In some species, these are pale yellow, in other they are very dark black. Their width is also variable. Similarly, the extent of leg marking is variable, with more pigmented species having heavy black bars around the joints of their legs. The femoral spotting, however, is invariably present.

Material Examined.—This species is common throughout Haleakala National Park and Waikamoi

Preserve (Table 1). *Maui Island*: Haleakala. Honomanu Gulch, 1876 m, 29-V-88, 22-VI-89 & 5-II-90 (R. G. Gillespie & C. Parrish); 1585 m, 6-II-90 (R. G. Gillespie). Waikamoi Gulch, 1310 m, 13-VIII-88 (R. G. Gillespie & C. Parrish). Opana Gulch, 1340 m, 8-VI-88 & 12-VII-88 (R. G. Gillespie & C. Parrish); 8-II-90 (R. G. Gillespie & J. Burgett). Bogs, NE Rift Haleakala, 1676 m, 15-I-88, 16-I 88, 17-I-88 & 18-I-88 (R. G. Gillespie & A. C. Medeiros); Kipahulu Valley, 1524 m, 14-V-90 (R. G. Gillespie & A. C. Medeiros).

Tetragnatha paludicola, new species
(Figs. 71–84, 90, 91)

Types.—Holotype male and allotype female from the bogs on the NE Rift of Haleakala, 1676 m, Maui Island (18 January 1988), collected by R. G. Gillespie and A. C. Medeiros, deposited in the Bishop Museum, Honolulu.

Etymology.—Palus (Latin) bog; colo (Latin) to dwell in a place. The specific epithet is used in its adjectival form and refers to the very wet, boggy habitats to which this species is virtually confined.

Diagnosis.—The most diagnostic feature of *T. paludicola* in the field is the smoothly oval, bottle green abdomen with red chevrons, and paired yellow marks on the venter. The color mostly fades in alcohol, but the cheliceral armature and shape of the palpal conductor are still distinctive.

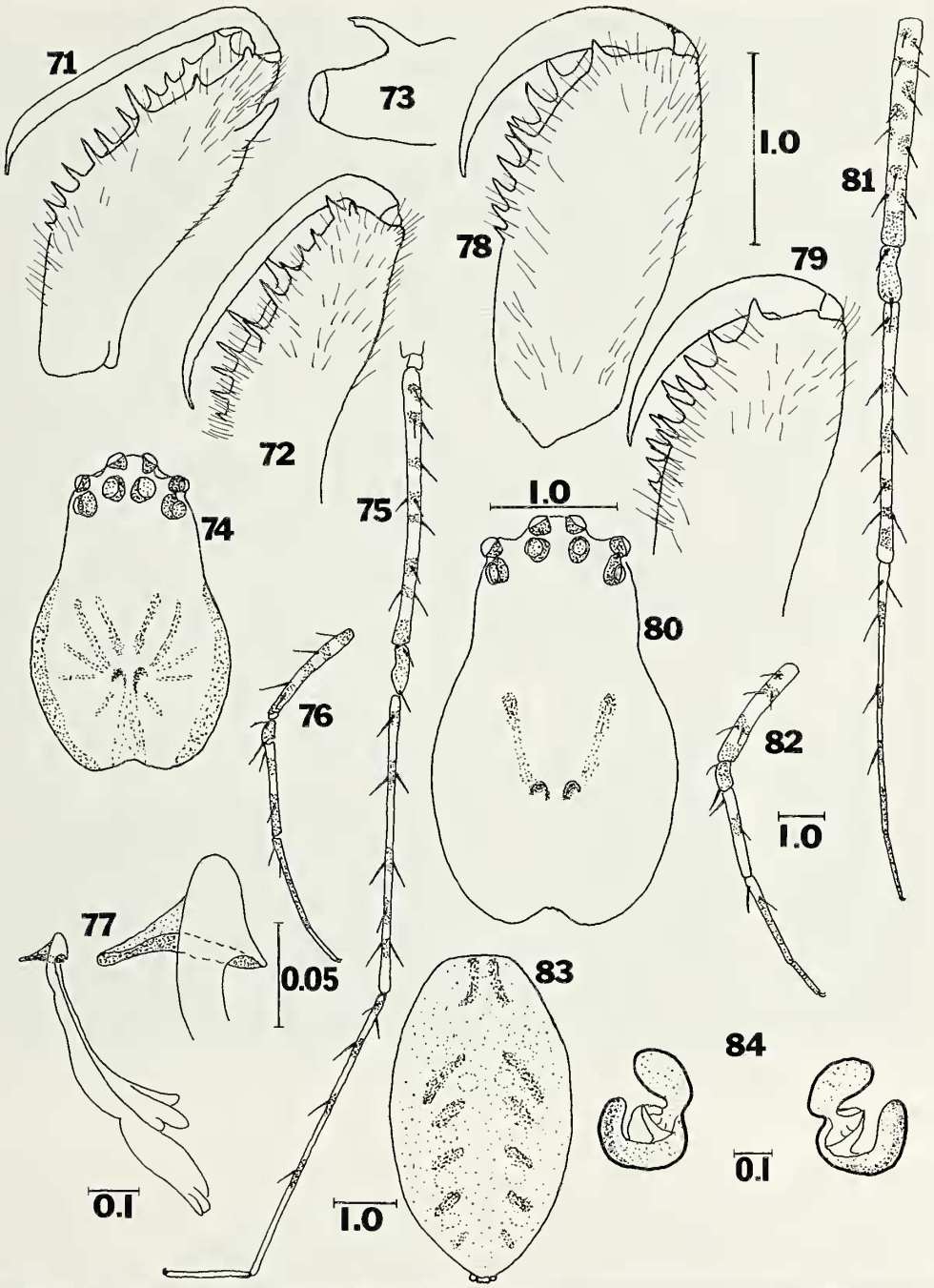
Description.—*Holotype male:* (Figs. 71–77). Promargin of chelicerae (Fig. 71): Distance between 'Gu', 'sl' and 'T' approximately equal, ratio of distal end to 'sl': 'sl' to 'T': 'T' to 'rsu1' 3:3:3. 'Gu' pronounced, small, cone-shaped tubercle; 'sl' medium-sized cone directed out and slightly up from margin of chelicerae; same width as 'T', but much shorter, 37% height (35–48%). 'T' tall, narrow, rather straight spike. 'rsu' 5 (4–5) spikes, 'rsu1' and 'rsu2' slightly divergent. Retromargin of chelicerae (Fig. 72): Total of 6 teeth. 'AXI' conspicuous cone-shaped notch; 'GI' strong and robust, wider but of similar height to 'L5' and 'L6', much stronger than 'L2'–'L4'. Dorsal spur long, shaped like slim, bent finger (13.7% length of cephalothorax); tip considerably longer on dorsal side (Fig. 73). Cheliceral fang shorter than base, bent sharply at both proximal and distal ends. Cephalothorax 2.6 mm (2.2–2.7), total length 5.7 mm (5.4–5.8). Chelicerae shorter (75%) than cephalothorax. Depression of thoracic fovea in form of paired semicircles (Fig. 74). Leg spination similar to female (Figs. 75–76). Femur I: 5 prolateral, 4 dorsal, 2 retrolateral spines. Tibia I: 3 prolateral, 2 dorsal, 3 retrolateral spines. Metatarsus I: 1 prolateral, 1 dorsal, 3 retrolateral spines. Femur III: 3 dorsal, 2 prolateral, no ventral spines. Tibia III: 1 dorsal, 1 prolateral spine. Coloration and eye pattern similar to female.

Conductor Tip: (Figs. 77, 90, 91). Symmetrical, high-peaked cap, terminating in smoothly tapered, downward-pointing projection.

Allotype female: (Figs. 78–84). PME separated by just less than width of PME (Fig. 80). Median ocular area wider posteriorly. Lateral eyes contiguous. Promargin of chelicerae (Fig. 78): series of 6 teeth, 'U1' very robust, considerably wider but shorter (64%) than 'U2'; widely separated from 'U2' by 28% cheliceral length. 'U2'–'U7' gradually decreasing in size proximally. Retromargin of chelicerae (Fig. 79): series of 7 teeth, 'L1' slightly shorter than both 'U1' (92%) and 'L2' (86%). 'L1' distinctly separated from 'L2', teeth barely (if at all) decreasing in size proximally. Cheliceral fang short, approximately 66% length of base, tapering to smooth point at distal end. Cephalothorax 3.3 mm, total length 8.6 mm. Chelicerae rather short, 65% length of cephalothorax. Legs well spotted, banded with reddish brown on yellow (Figs. 81, 82). Spines short (23% length of cephalothorax). Femur I: 5 prolateral, 4 dorsal, 2 retrolateral spines. Tibia I: 3 prolateral, 2 dorsal, 3 retrolateral spines. Metatarsus I: 1 prolateral, 1 dorsal, 3 retrolateral spines. Femur III: 3 dorsal, 2 prolateral, no ventral spines. Tibia III: 1 dorsal, 1 prolateral spine. Cephalothorax pale brown, with distinct double fovea marked by darker lines along medial and anterior borders (Fig. 80). Sternum black with central translucent yellow area. Abdomen broad, deep, width and depth both approximately 46% of total length (Fig. 83). Dorsum of abdomen green/brown (bright bottle-green in life), with distinct paired marks running down midline (in life, paired red chevron marks). Venter brown, 2 pairs of gold vertical bars on either side of midline.

Seminal receptacles: (Fig. 84). Two bulbs linked in tight opposing, almost closed "comma" shapes, each well sclerotized on medial border. Upper bulb larger and more dilated than lower; central portion serves as a wide stalk between bulbs. Median lobe an ill-defined balloon projecting from stalk, virtually enclosed by bulbs.

Color polymorphism.—This species exhibits continuous variation rather than polymorphism, and this is evident only in living specimens, in the form and extent of the paired red marks down the midline.



Figures 71–84.—*Tetragnatha paludicola*; Male holotype. 71) Promargin of right chelicera; 72) Retromargin of left chelicera; 73) Dorsal spur of right chelicera, lateral view; 74) carapace, dorsal view; 75) Right leg I, dorsal view; 76) Right leg III, prolateral view; 77) Left palpus, prolateral view. Female allotype. 78) Promargin of right chelicera; 79) Retromargin of left chelicera; 80) Carapace, dorsal view; 81) Right leg I, dorsal view; 82) Right leg III, prolateral view; 83) abdomen, dorsal view; 84) Seminal receptacles, ventral view. Scale lines in mm. Scale of Figs. 71–73, 78, 79 indicated beside 78; scale of 74, 80 indicated beside 80; scale of 75, 76, 81, 82 indicated beside 82.

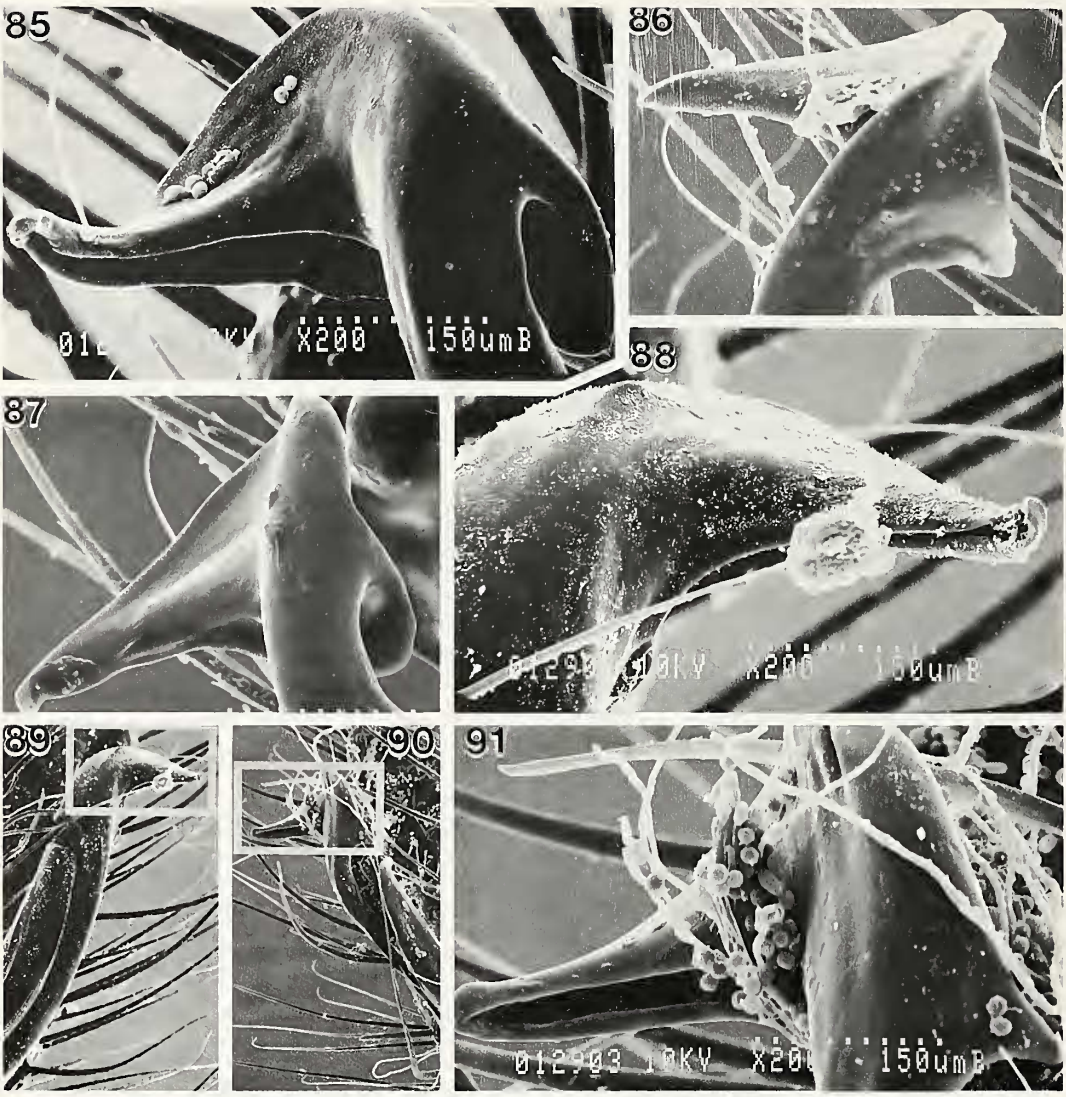


Figure 85–91.—Scanning electron micrographs of conductor tips of male palps: 85) *T. trituberculata*; 86) *T. eurychasma*; 87) *T. filiciphilia*; 88–89) *T. stelarobusta*; 90–91) *T. paludicola*. Scale: Figs. 85–88, 91 is 1000×; Figs. 89, 90 is 200×.

Material Examined.—This species is found in very wet forest only (Table 1). *Maui Island*: Haleakala. Bogs on north east rift of Haleakala, 1676 m, 15-I-88, 16-I-88, 17-I-88 & 18-I-88 (R. G. Gillespie & A. C. Medeiros). Kipahulu Valley, 914 m, 16-V-90, 1524 m, 14-V-90 (R. G. Gillespie & A. C. Medeiros).

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